



Addis Ababa University  
School of Commerce

**PROJECT MANAGEMENT**

**Causes and consequences of project cost overrun in the  
construction of Kadisco General Hospital expansion  
project**

A project work submitted in partial fulfillment of the requirements for  
the award of Master of Arts in Project Management

By: Elias Mohammed

Advisor: Beza Libeyesus Nisrane (Ph.D.)

June 2023

Addis Ababa

ADDIS ABABA UNIVERSITY  
SCHOOL OF COMMERCE

PROJECT MANAGEMNT PROGRAM

Causes and consequences of project cost overrun in the  
Construction of Kadisco General Hospital expansion  
project

BY: ELIAS MOHAMMED

Approved by Board of examiners:

_____	_____	_____
Advisor	Signature	Date
_____	_____	_____
External Examiner	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date

## Declaration

I, **Elias Mohammed Ahmed**, have carried out independently a project work entitled “Causes and consequences of project cost overrun in the Construction of Kadisco General Hospital expansion project” for the partial fulfillment of the award of the Master of Arts program in project Management with the guidance and support of the research advisor.

This study is my original work and that has not been presented for any degree or diploma program in this or any other university.

Declared by: **Elias Mohammed Ahmed**

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Acknowledgment

First of all I would like to thank almighty God for the uncountable blessings through everything. Sincerely I would like to express my gratitude and acknowledgements to my adviser Dr. Beza Libeyesus Nisrane for her constructive comment, suggestion, and advised me to improve the quality of this paper during the project work.

Furthermore, I would like to thank all the engineering department team of Kadisco hospital, the employees from all the contractors in the project, and the employees of the consultant for their willingness and support to provide all the necessary documents for the successful completion of the study.

I would also like to acknowledge all the people who supported me in different ways to finish this degree program that their support was really helpful.

## List of tables

Table 3.1: Reliability result

Table 4.1: contract discrepancy and cost overrun

Table 4.2: Bidding price of contractors

Table 4.3: Summary of responses and level of impact of each factors ranked

## List of Figures

Fig 4.1: Gender of respondents

Fig 4.2: Age of respondents

Fig 4.3: Educational background of respondents

Fig 4.4: Experience in current organization of respondents

## Abbreviations

GDP - Growth domestic Product

KGH - Kadisco General Hospital

BIM - Building Information Modeling

AABPCA - Addis Ababa Building permit and Control Authority

SPSS - Statistical Products and Service Solution

P1, P2, P3 - Building permit one, permit two, and permit three

ECA - Economic commission for Africa

.

# Table of Contents

Abstract.....	
<b>1 CHAPTER ONE INTRODUCTION</b>	
1.1 Background of the study .....	<b>Error! Bookmark not defined.</b>
1.2 Background of the company .....	2
1.3 Statement of the problem .....	3
1.4 Research questions.....	4
1.5 Research objectives.....	4
1.5.1 General Objectives.....	4
1.5.2 Specific objectives .....	4
1.6 Significance of the study.....	5
1.7 Scope of the study.....	6
1.8 Limitation of the study.....	6
1.9 Organization of the study.....	6
<b>2 CHAPTER TWO LITERATURE REVIEW</b>	
2.1 Introduction.....	7
2.2 Definition of Cost Overrun .....	7
2.3 Causes of project cost overrun .....	9
2.3.1 Project initiation phase.....	10
2.3.2 Project planning phase .....	11
2.3.3 Project Execution phase.....	13
2.4 Effects of Project Cost Overrun .....	14
2.5 Mitigation Strategies for Controlling Cost Overrun .....	15
2.5.1 Project Initiation phase.....	16
2.5.2 Project planning phase .....	16
2.5.3 Project Execution phase.....	16
2.5.4 Project monitoring phase .....	17
2.6 Empirical studies review .....	17
<b>3 CHAPTER THREE RESEARCH METHODOLOGY</b>	
3.1 Research design .....	19
3.2 Research approach .....	19
3.3 Description of study variables .....	19
3.5 Data collection methods.....	<b>Error! Bookmark not defined.</b>
3.6 Data analysis .....	<b>Error! Bookmark not defined.</b>
3.7 Reliability and validity analysis.....	21

3.8 Ethical Consideration.....	22
<b>4 CHAPTER FOUR RESULTS AND DISCUSSION</b>	
4.1 Introduction.....	23
4.2 A Short lifecycle history of the project.....	23
4.3 Data from the owner interview .....	25
4.3.1 Data from the contractors.....	26
4.3.2 Data from the consultant.....	27
4.3.3 Data from the building permit and control authority .....	28
4.4 Factors of Project Cost overrun .....	257
4.5 Effects of Project Cost overrun .....	258
4.6 Document Review .....	259
4.7 Level of impact of cost overrun factors .....	3232
<b>5 CHAPTER FIVE CONCLUSION AND RECOMMENDATION</b>	
5.1 Introduction.....	355
5.2 Conclusion .....	355
5.3 Recommendation .....	366
5.3.1 To the client .....	366
5.3.2 To the contractors .....	377
5.3.3 To the consultant.....	388
5.3.4 To building permit and control authority .....	399
References.....	430
Appendix.....	433

## Abstract

*The construction industry is one of the biggest economic sectors in Ethiopia. It plays a significant role in the development of the country by providing employment opportunities and infrastructure development. However, the industry is overwhelmed with several challenges, which affect the completion of projects within a given budget and timeline.*

*So this project work focuses on the cost overrun causing factors on one of the projects in the city that is Kadisco hospital expansion project. The study is done in descriptive research design by collecting both quantitative and qualitative data. Interviews, document review, and questionnaire technique were applied to collect data. Based on the data found, twenty-Five cost overrun factors has been identified and ranked on their level of impact and 8 factors (material cost increased by inflation, shortage of material, scope change, complexity of the project, and change order (rework). Inappropriate chain of command, labor cost increased, and lack of clear goal and objective on client side) stood out scoring average mean value of above 3.40 as a major impactful factors on the project to deal with cost overrun.*

*The cost overrun mainly affects the owners of the project and the effects are quality compromisation by choosing less quality and less expensive finishing material due to lack of finance, the hospital is forced to be involved in additional debts to finance the project, the contractors and the consultant also losses their reputation by the management team of the hospital.*

*Finally mitigation strategies and recommendation for the main stakeholders are forwarded to be implemented on the second phase of the project and other future projects to avoid or mitigate possible project cost overrun.*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Nowadays in Ethiopia construction industry is one of the biggest economic sectors. It contributes a lot for the development of the country by providing employment opportunities and infrastructure development. However, the industry is overwhelmed with several challenges, which affect the completion of projects within a given budget and timeline. One of the most significant problems is construction project cost overruns, whereby the actual cost of a project becomes more than the initial estimated budget. Cost overruns can be a result of various factors, including poor project management, inadequate planning, design changes, inflation, poor estimating, and inadequate coordination between stakeholders. These factors have a significant impact on project completion time, quality, and ultimately the cost. (Fetene Nega 2008).

This project work aims at identifying the main factors that causes the cost overrun in the construction of Kadisco general hospital expansion project. The study examined factors responsible for cost overruns and its impacts on the success of the project. Additionally, this project work explored the level of impact of the factors by ranking the factors.

The study's findings will help construction stakeholders, including contractors, architects, engineers, project managers, consultants, and clients, understand the causes of construction cost overruns and identify ways to mitigate them. Specifically this project work will help the first stakeholders which are the owner (the hospital), the consultant, and the contractors for their second phase expansion project and their other projects. Consequently, this project work will contribute to improving the construction industry's efficiency and productivity, leading to economic growth and development.

## 1.2 Background of the company

Kadisco general Hospital is the sister company of one of the leading paint manufacturing company Kadisco chemical industry, the Kadisco group, and the SMATARA forwarding company. After a long exhausting period of planning and preparation, KADISCO general hospital was inaugurated on May 1 2007 and commenced to render its services promptly.

Its primary objectives focuses on ensuring society's health through cutting-edge preventive and diagnostic medical procedures. The hospital is situated in the Gerji region, also known as 46 Mazorya, on a large, level plot of land. The hospital is specially constructed to support a regal entrance with wide reception and hallways, spacious patient rooms, and healthcare facilities. We have access to a variety of medical equipment units and other facility sections, which enables us to:

- Maximize the comfort of the patients and visitors.
- Create a conducive atmosphere, which inspires and enables health.
- Professionals and other staff members are present to efficiently and ethically deliver health services.
- Create a space, which accommodates and allows the effective utilization of manpower and medical equipment.
- Provide Credit facilities for companies such as ECA, Banks, insurances, etc.
- Maintain each space and corner constantly clean etc.

And currently, the hospital is expanding its services and facilities by constructing a huge building in its existing compound to enhance and improve its healthcare service to the society. (<http://kadcogroup.com/kggh/about-us/>)

### 1.3 Statement of the problem

Generally, construction projects are complex and the construction of hospital buildings is a more complex process that requires careful planning and execution to make sure that the project is completed within budget and on time. However, despite the best efforts of project managers and contractors, cost overruns is becoming a common and repetitive problem in the construction industry. Cost overruns can have a significant impact on project success, leading to delays, reduced quality, and increased costs.

It is a common practice to observe project cost overruns in many construction projects, Flyvbjerg et.al. (2004) states that 90% or nine out of ten projects deals with project cost overruns. And most professionals and other stakeholders are taking project cost overruns as a normal or common thing that happens in most building construction projects and it is the author's believe that it shouldn't be taken as a normal and there must be some management practices and strategies to prevent project cost overruns from happening.

Daniel B. (2017) indicates that several factors can contribute to cost overruns in construction projects. These include inaccurate project estimates, major design errors, poor planning of change orders that requires rework, administrative negligence, poor site management, and failure to select the right team. Aside from these factors, other causes of cost overruns may include design issues and incomplete design, poor communication skills, lack of experience, and ability of those involved, financial mismanagement, contract management issues, and land/site issues.

During the preliminary assessment in the construction of kadisco general hospital expansion building, the author found that the project dealt with cost overrun, and due to the occurrence of the cost overrun, the project faces so many difficulties and problems some of the main problems are the consultant was forced to compromise quality by choosing less quality and cheap materials to use the budget for other more essential works, the owner of the hospital is also forced to look for additional finance and debts. Due to lack of finance the project delayed from the estimated schedule. There was contract termination with the main civil contractor which was a grade one contractor and running the project with the desired quality and schedule. The reason for termination was the inability to pay the contractor on its level.

So this project work is designed to investigate the various causes that lead to project cost overruns of the construction of Kadisco general hospital expansion project and the recommendation might be applicable in the second phase of the project and other similar

projects too. And even if there are similar previous studies related to cost overrun of construction projects this study will be among the few studies done on health care facilities or hospital projects since this type of construction projects are more complex than other construction projects so future study on hospital projects will get a reference to start their study and projects.

## 1.4 Research Questions

1. What are the main causes of project cost overrun in Kadisco hospital expansion project?
2. What are the main effects of the cost overrun on the overall performance of the kadisco hospital expansion project?
3. What is the level of impact of each factor on the project?

## 1.5 Research Objectives

### 1.5.1 General Objectives

The general objective of the study is to identify and assess the major causes of cost overruns that occurred in the construction project of the Kadisco Hospital expansion building.

### 1.5.2 Specific objectives

The study's Specific objectives are mainly:-

- To identify the causing factors of the cost overrun in construction project and to evaluate their relative impact.
- To forward recommendations to the respective stakeholders that can be applied in the second phase of the project and other projects to avoid or mitigate those factors which causes cost overrun.

## 1.6 Significance of the study

Generally assessing the causing factors that lead to project cost overruns in the construction of hospital buildings is important to the success of such projects. Hospital construction projects are often complex and the probability of cost overruns is more likely to happen compared to other projects and this problem can result in significant financial losses. (Niluka Domingo, 2015)

The findings of this study will be very helpful to the various project stakeholders, as well as to other parties like researchers who has interests in the field. In order to help design and construction teams, consultants, clients, and other stakeholders in the construction industry, particularly for hospital construction projects, better understand the reasons behind cost overruns, this study's paper will present key information. Additionally, it will provide guidance for the building permit authority's work in developing and implementing policy and suggest potential solutions, practices, and methods that can be used to reduce or avoid cost overruns and will ensure that projects in the construction sector are finished on time and within budget.

Since this study is a project work expected to be a problem solving mainly targets one organization, in this case Kadisco General Hospital, the main and immediate significance of the study is by identifying and assessing the main factors that contribute to project cost overruns and giving recommendations to mitigate the cost overruns to the main stakeholders which are the hospital, the consultant, and the contractors can apply the recommendations on the second phase of the hospital's expansion projects and also other projects that the stakeholders will do in the future.

Ultimately, by applying the recommendations all the stakeholders will benefit from it. And it can help to ensure that hospital building constructions and other constructions are completed on time and on budget, allowing healthcare providers to provide improved services to their communities and also it adds a little knowledge to the literature.

### 1.7 Scope of the Study

This study is conducted in Kadisco Hospital and its expansion building construction project located in Addis Ababa. And since this study is done as project work, it is limited to the expansion construction project of the hospital and the other major stakeholders namely the consultant, the different contractors participated on the project, and the government's building permit authority and regulatory body with regard to the hospital's project.

### 1.8 Limitation of the Study

During this project work some limitations were there during data collection stage the researcher can't access the contract agreement of the one contractor out of the eight contractors participated in the project but finally the contract amount is included in the total actual cost of the project from the data obtained from the owner's database but the full contract agreement is not fully accessed and also other organizations are not included in the study and therefore generalizability is limited.

### 1.9 Organization of the Study

This project work report is organized into five separate chapters that provide a comprehensive overview of factors causing project cost overrun in Kadkisco hospital expansion project. The first section provides an introduction to the topic and highlights the background of the study, research problem, objectives, research questions, significance of the study, and scope of the study. The second chapter reviews the relevant literatures related to project cost overrun. The third chapter describes the methodology used to collect and analyze data, including the research design, data collection tools, and statistical analysis techniques. The fourth chapter presents the findings of the study, and discussion of their implications. Finally, the report concludes with a summary of the main findings, highlights the contributions of the study, and provides recommendations for the stakeholders mainly the client, the contractors, the consultant, and also for the building permit and control authority.

## CHAPTER TWO LITERATURE REVIEW

### 2.1 Introduction

The construction industry in Ethiopia has grown rapidly in recent years with significant investment in construction developments. The construction sector is an important part of the country's economy and contributes a lot to the country's gross domestic product (GDP). The Ethiopian government invests heavily in the construction industry which will boost the country's economic growth. Additionally, private sector investment in the construction sector, particularly in properties, has exploded as demand for housing continues to grow. Despite the challenges the sector is facing, including a lack of skilled labor and insufficient funding, the construction sector in Ethiopia remains a key driver of economic growth and development. Even though this sector is a major contributor to the country's economy most of the projects experience project cost overruns. (Maerege Gebrehewot, Maru Shete, 2019).

Flyvbjerg, et. al. (2004) in their study data collected from more than twenty countries, the authors found that cost overruns are a significant issue in the construction industry, affecting 9 out of 10 projects.

This section of the paper will provide insight of the concept of cost overrun and the factors that contribute to construction project cost overruns through a thorough review of prior research conducted by a variety of researchers in various construction environments. This review of the literature is particularly significant because it contributes significantly to the list of causes to be taken into account for the study and the creation of a conceptual framework for the design of the research method.

### 2.2 Definition of Cost Overrun

Most scholars and researchers define the word cost overrun more or less in similar ways and other researchers define it differently, Enshassi, et. al., (2009) in their research paper stated that scholars use the word cost overrun and cost escalation simultaneously as similar words "(Cost overrun is also called "cost escalation," "cost increase," or "budget overrun)" (Zhu & Lin, 2004). But in the researcher's observation and practical understanding, the two words are used differently by Ethiopian construction professionals. The professionals use cost escalation as an increase in the cost of something, equipment, or material due to continuing

price changes over time. So the following definitions of cost overrun are selected due to their expressiveness and appropriateness for this project is:

- “The excess of actual cost over budgeted cost which occurs when the final cost of the project is more than the original estimates.” (Azhar et al., 2008).
- “Cost overrun is defined as the excess of actual cost over budget. Cost overrun is defined as the change in contract amount divided by the original contract award amount. This calculation can be converted to a percentage for ease of comparison. The difference between the actual cost and the initially projected cost.” (Naveenkumar et.al, 2016, p2).

$$\text{Cost overrun} = \frac{(\text{final contract amount} - \text{original contract amount})}{\text{Original contract amount}}$$

Other writers support the idea that cost overrun should be determined by contrasting the initial contract amount with the project's final cost at the time of completion. The value of cost overrun which have been reported over time may vary depending on how cost overruns are defined (Love, et al., 2012).

Matti (2015) noted that even though there is a lot of information and studies about cost overruns in public projects that does not imply that there are no cost overruns in the private sector. In fact, the authors support the notion that private-sector projects frequently experience greater cost overruns. On the other hand, Koushki, et al. (2005) stated that cost and time overruns occur frequently in both large and small, straightforward projects. Frimpong, et al. (2003) also addressed this topic and noted that overruns are more common and significant in complex and time taking or long duration projects than in small projects. Gkritza and Labi (2008) backed up this assertion and added that lengthy projects also tend to experience more cost overruns. However, James Odeck (2004) disagrees with the idea that large projects faces more cost overrun and reasoned out that large projects experience fewer cost overruns because managers give these projects more attention than they typically do with small projects.

### 2.3 Causes of project Cost overrun

For the successful completion of construction projects it is a must to follow strict and well-organized management practices in each and every activity throughout the project life cycle says I. Abdul Rahman (2013). If a construction project is said to be a successful project, it has to be finished in the allocated time, within the contracted budget, and according to the specified parameters or quality.

It's easy to say that construction projects cost overrun have become common thing for the entire sector. Construction professionals can't really afford to accept the new normal, though, with budgets for new projects being examined more closely than ever and industry productivity as a whole still a constant worry. Understanding the cause of cost overruns in construction projects is crucial to finding solutions. (Enshassi et al. 2009)

Overruns frequently indicate more serious management problems, as well as improperly established project time schedules and budgets from the outset of the projects. Even though many factors like extreme weather conditions or other uncontrollable factors can have an impact on budgets, faulty analysis or planning done before construction even begins is the typical cause of project overruns. (Flyvbjerg et.al. 2004)

There are many causes that could force projects to face project cost overrun. Because construction industry is a multidisciplinary industry and involves a lot of stakeholders, including contractors, consultants, the project owner and various professionals, and suppliers, Jackson, & Steven (2001), noted that a wide range of factors affects a construction project's cost. As a result, the cost of a construction project is dependent on different factors, including a number of factors related to the project's characteristics, the construction team, and the market environment.

Most of the cost overrun-causing factors in construction projects have been identified by prior research studies. Enshassi et al. (2009) noted that poor management, control systems, manpower, project estimation, and financial constraints, as well as work scope and objectives, were potential causes of project cost overrun in public construction projects.

Ray R. et. al. (2008) lists additional, external causes for project cost overruns that include things like inflation, interest rates, environmental concerns, and currency exchange rate fluctuations. These causes are especially relevant for projects where technical issues and other challenges extend project duration.

Previous studies indicates that there are a lot of different factors that cause cost overrun on construction projects and most of the factors stated by the writers are actions or decisions that happen during the project life cycle from the project initiation stage to the project closing stage. So accordingly the study is designed to analyze the causing factors of project cost overrun from project initiation to project closing.

### 2.3.1 Project initiation phase

The initiation phase is the first stage of a project. In this phase, a business opportunity or problem is discovered, and a business case with a range of potential solutions is defined. After conducting a feasibility study to determine whether each option actually solves the business problem, a final suggested solution is then presented. Once the suggested solution has been accepted, a project is started to implement the accepted solution. The terms of reference, which describe the goals, parameters, and framework of the new project, are finished. (Jason Westland, 2007)

Project initiation is a crucial phase that determines the success of a project. During this phase, the project objectives and goals are defined. The main goal of project initiation is to create a shared understanding of what the project aims to achieve, identify potential problems or risks, and establish an agreement between the stakeholders on the expectations of the project. To initiate a project, it is important to start with a clear business value that defines the need for the project. This should include the benefits that the project will bring, the problems it will solve, and the justification for investing in the project. Once the business value is approved, the project can proceed to the next stage which is the planning phase. The first step is to define the project objectives and scope, which outlines what the project aims to achieve and the boundaries within which it will operate. This helps ensure that everyone involved in the project has a clear understanding of its goals and expectations. (Kerzner, Harold. 2006)

### 2.3.2 Project planning phase

The project moves into the planning phase once the objectives and scope of the project is defined in the initiation stage.

Project planning is the process of defining the objectives, requirements, tasks, resources, and timeline for a project. It involves carefully evaluating the project goals, identifying potential risks and challenges, and mapping out a plan to avoid those risks and overcome the challenges. Effective project planning is essential for ensuring that a project is completed on time, within budget, and to the desired quality standards. It helps project managers to allocate the right resources at the right time, identify potential issues early on, and make informed decisions based on data and insights. (Kerzner, Harold. 2006)

The primary tasks during this phase include creating a project plan that outlines the tasks, activities, dependencies, and deadlines as well as a resource plan that lists the personnel, equipment, and materials required. a quality plan with quality objectives, assurances, and controls, A financial plan outlining labor, equipment, and material costs, a risk management strategy describing potential risks and the actions to be taken to mitigate them, a plan for customer acceptance outlining the requirements that must be met, a communications strategy outlining the information needed to update stakeholders, a purchasing plan outlining the products that will be obtained from outside vendors. (Jason Westland, 2007)

The lack of proper project planning can result in cost overruns. Without adequate planning, projects are prone to unforeseen changes, scope creep, resource constraints, and other unexpected factors that can increase overall project costs. Cost overruns can occur due to unrealistic project timelines, poor management of resources, miscommunication between team members, or a lack of a comprehensive risk management plan. Inadequate planning can also lead to ineffective project tracking and control, making it difficult to monitor progress and keep the project on track. Therefore, effective project planning is crucial for delivering projects within budget and on-time, while minimizing the risk of cost overrun.

This is an important phase in the management process regarding cost because poor planning can lead a project to ongoing stress and compromise, leaving neither the client, the end user, nor the design team fully satisfied. It is common practice at this point to apply historical data without accounting for the numerous variables that influence construction costs, including

project size, price increases, delivery method, overall quality of the project envisioned, etc. (Kerzner, et al, 2006).

Poor initial cost estimates are mostly the outcome of underestimating the scope and difficulty of the task at hand. The obvious explanation for this is that project task performance and duration evaluations are frequently conducted in isolation, without taking the influence of nearby activities into account. Furthermore, we make the mistake of assuming that everything will go according to plan and fail to foresee potential issues that could arise in the future. A low initial cost estimate can frequently lead to project cost overruns because the resources needed for the project may have been underestimated, which resulted in insufficient funding being allocated to finish the project. The project team may not be able to complete all required tasks if the cost estimate is too low, which could result in unanticipated additional work or incomplete work. This would consequently result in project delays, and higher costs, and could affect the project's overall success. (Ray R. et. al. 2008).

It is also stated by Ray R. et. al. (2008) that Cost overrun is also a result of poor scope definition. As a result, projects may lack a distinct purpose, objectives, features, or even direction. It is important to realize that project cost estimation will be useless if the initial stages of creating a thorough scope statement and work breakdown structure are not properly carried out. Numerous research and development initiatives carried out by public and private organizations make this issue clear.

On the design phase of the project, it is crucial to keep track of the project's estimated cost by using a series of increasingly accurate cost-estimating techniques that coincide with further development of design and construction details after an initial budget has been set, the scope defined, and the quality expectations documented. And also choosing the most appropriate professional for the design of the project and having a fully documented and approved design will help to minimize the chance of encountering cost overrun during the next stages of the project life cycle. A constructability review of the drawings and specifications is also necessary. In this step, the construction documents are examined for completeness, activity coordination, cost-effective designs, and general code compliance. It's also a good idea to check the specifications to make sure the general requirements aren't too stringent. (Daniel Bekele, 2017).

### 2.3.3 Project Execution phase

Project execution is the stage when the actual work on the project starts. During this stage, all tasks, activities, and resources are coordinated and aligned with the plans, standards, and goals defined during the previous stages of the Project life cycle. The successful completion of the execution stage leads to the achievement of project objectives as they have been set by the project manager. This stage is the most complex and challenging one as it requires project team members to work collaboratively, closely monitor progress and address any issues or change requests that may arise. The coordination of multiple activities that happen simultaneously while ensuring that all team members work towards the same goal underlines the importance of communication throughout this stage. (Kerzner, Harold. 2006.)

In terms of project cost overrun, the effectiveness of project execution plays a crucial role. Poor project execution can lead to delays in project delivery, rework, and unforeseen costs, which can cause project costs to exceed the initial budget. Effective project execution, on the other hand, can help to prevent cost overruns by enabling project teams to identify potential challenges in advance and develop contingency plans to mitigate those risks. Additionally, efficient project execution can lead to the timely completion of the project, which can save costs associated with project overhead and financing fees. Therefore, it is essential for project managers to focus on executing the project plan effectively to minimize the likelihood of cost overruns and ensure project success.

The other major reason for cost overruns during the execution period is unanticipated technical issues. Inadequate initial design is typically where this issue originates, but it is not always the case. Testing frequently leads to revelations that may not have been immediately obvious during the initial design stage, usually in the form of issues and technical issues that need to be fixed. Since adherence to technical requirements is essential to the functionality and acceptability of a product, the only option available when these problems arise is to incur additional costs. (Ray R. et. al. 2008)

Poor communication in construction projects can also have a significant impact on the project cost. Ismail Abd Rahman et.al. (2019) in their study states that poor communication in the execution phase of projects is the main factor for the cost overrun in different ways Some of the ways in which poor communication can lead to cost overruns include Misunderstandings as a form of poor communication can cause instructions to be misunderstood, which can

result in errors and extra work, Lack of Coordination is the other form of poor communication teams and stakeholders are frequently involved in construction projects. Poor communication between these groups can result in a lack of coordination, which makes it challenging to schedule work and ensure that everyone is pursuing the same objectives.

## 2.4 Effects of Project cost overrun

Project cost overrun is one of the major problems that construction projects encountered. Cost overruns have a significant negative impact on many different aspects of the construction project. Project cost overruns can adversely affect the financial performance of organizations involved in executing the projects. Funds designated for other projects are taken away to pay for costs that weren't initially budgeted for, seriously endangering the project's overall profitability. Additionally, it might result in diminished stakeholder trust, which might be bad for upcoming partnerships or collaborations. (Matti, 2015)

Project delay, supplementary agreements, and additional costs are the typical effects of cost overrun in the nation as a whole ( budget shortfall), Participants in the project argue with one another, loss of the consultant's reputation, the project owners' perception of the consultant as incompetent, high cost of contract administration and supervision for consultants, delayed contractor payments, Poorly done projects, project owners' dissatisfaction, which leads to end users' dissatisfaction, negative perception of the construction sector by higher public authorities and society at large.

Effective contract administration is crucial for consultants to ensure timely and fair payments to contractors. Delayed payments can cause budget shortfalls for the contractor, leading to poor quality workmanship and dissatisfaction by project owners and end users. This can further contribute to a negative attitude towards the construction industry by higher public authorities and society as a whole. To avoid these issues, consultants must establish clear communication channels with contractors and ensure that all parties are aware of their obligations and responsibilities. Additionally, regular monitoring of progress and quality control measures can help identify any potential issues early on, allowing for prompt resolution. By prioritizing effective contract administration, consultants can help maintain positive relationships between all stakeholders involved in a construction project, ultimately leading to successful outcomes for everyone involved. (FeteneNega, 2008).

## 2.5 Mitigation Strategies for Controlling Cost Overrun

Construction project delays and budget overruns have been major setbacks for the industry, and they are an even bigger problem in developing countries. Although it appears that there is widespread awareness of this phenomenon and great effort has been made to pinpoint its causes and develop mitigation strategies, time and cost overrun continue to be significant industry-wide issues. It takes sound planning, ethical behavior, and careful judgement to keep construction projects within estimated budgets and timelines. Utilizing effective project management techniques and tools is the main action that can be taken to reduce the causes and effects of cost overrun. (Nadzirah 2015).

In order to avoid or mitigate the effects, planning and corrective actions are required that provide solution to the varied causes of escalating project costs. According to Matti, (2015), these are some of the promising approaches that are drawn from international experience of professionals to mitigate construction cost overruns. One promising approach to reducing construction cost overruns is to implement a rigorous risk management plan. This involves identifying potential risks and developing strategies to mitigate them before they become major issues. Another effective strategy is to establish clear communication channels between all stakeholders involved in the project, including contractors, subcontractors, and suppliers. This helps ensure that everyone is on the same page and working towards the same goals. Additionally, using technology such as Building Information Modeling (BIM) can help improve project efficiency and reduce errors. Finally, it's important to prioritize sustainability and energy efficiency in construction projects, as this can lead to long-term cost savings. By implementing these approaches and staying vigilant throughout the project lifecycle, it's possible to reduce the likelihood of cost overruns and ensure that projects are completed on time and within budget.

The different ways of mitigating project cost overrun could be applied during the different phases of the project life cycle which are the initiation phase, planning phase, execution phase, controlling and monitoring phase and the last one closing phase.

### 2.5.1 Project Initiation phase

During initiating the project the project initiator should understand the problem that the project will solve. Conducting a rigorous feasibility study to identify potential risks and challenges before investing too much in the project. Setting realistic budgets and timelines that accurately reflect the resources required to complete the project. (Daniel Bekele, 2017)

### 2.5.2 Project planning phase

Developing a detailed project plan that outlines all tasks, timelines, and resources required. Building contingency plans and buffers to account for unexpected events or costs. Hiten M Gawad et. al. (2020) pinpoints on their findings having a Master Program and detail Planning is critical. Planning and creating a project master program is one of the top priorities. An important aspect of any project's success is planning it from the beginning. The right planning team must be in place in order to create a project plan that is accurate and less likely to contain false information. A breakdown of the project plan for each stage of the project's life should be included in the master program. Utilizing the planning process is a crucial tactic for minimizing budget overruns and schedule delays. And Managing and Finishing the Design Stage Most professionals agree that design management is crucial before construction begins to ensure that a project is completed on time and within the allocated budget.

### 2.5.3 Project Execution phase

In order to mitigate cost overrun during the execution period of the project, Hiten M Gawad et. al. (2020) suggests that it is necessary to ensure effective cost management practices are implemented from the outset. This includes Implementing Correct Processes and Procedures, making sure that activities are completed with the desired quality to avoid rework, and creating a good communication channel. It is also important to identify potential risks and develop contingency plans to address them. Regular communication with stakeholders is essential to ensure everyone is aware of any changes or issues that may impact the project's budget. Additionally, it may be beneficial to explore alternative procurement methods or materials that could help reduce costs without compromising quality or safety. Utilizing technology such as project management software can also streamline processes and provide

real-time data on expenses and progress. Finally, it is crucial to have a skilled project manager who can oversee all aspects of cost management and make informed decisions when necessary. By implementing these strategies, the project team can proactively manage costs and avoid costly overruns during the execution period.

#### 2.5.4 Project monitoring phase

Monitoring progress against the project plan and budget is critical to ensuring that a project stays on track. By regularly reviewing progress, project managers can identify potential overruns early on and take corrective action before it's too late. Building in feedback loops is also essential to ensuring that stakeholders have a voice in the process. By providing opportunities for stakeholders to provide insight and course-correct as needed, project managers can ensure that the project meets their needs and expectations. This can help to avoid costly delays or rework down the line. In addition, regular communication with stakeholders can help to build trust and foster a sense of collaboration, which can be invaluable when it comes to navigating complex projects. Ultimately, by staying vigilant and building in feedback loops, project managers can increase their chances of success and deliver projects that meet or exceed stakeholder expectations. (Hiten M Gawad et. al. 2020)

#### 2.6 Empirical studies review

The issue of cost overrun in construction projects has remained a major challenge across the globe. However, the situation is more prevalent in developing countries where infrastructural development is still on the rise and funds are often limited. Cost overruns occur when construction projects exceed the budgeted cost, leading to financial losses, delays, and sometimes abandonment of projects. (Frimpong, et.al. 2003).

Yohannes Adamu (2018) quoted the following studies in his research paper “in Uganda, Northern by-pass project in Kampala was overrun by more than 100% and a study of a total of 30 projects showed that 53% of the projects had cost overruns. (Apolot, et.al. 2011)”. In Pakistan “Azhar et al. (2008) stated that cost overrun was a common problem in construction projects. The minimum range of cost overrun experienced was found as near around the 10% of the total cost of the project. In large construction firms these overrun ranged up to about 40% while in medium size firms this percentage increased up to nearly about 60% of the

project cost”. And also in Ethiopia Yohannes (2018) quoted Fetene (2008) “from his field study of 70 public constructions projects, revealed that 67 out of 70, (95.7%) of public building projects suffered by cost overrun in their projects execution. For the building construction projects, the actual cost at completion exceeded by 0 up to 126% from contract amount.”

## CHAPTER THREE RESEARCH METHODOLOGY

### 3.1 Research design

This study is started relying on personal observation and experience during the execution of the project as a preliminary assessment that the project dealt with cost overruns. The research design for this study is mainly descriptive. An attempt is made to explain and examine the level of impact of each cost overrun factors. Descriptive research design is chosen because the majority of the data that the study has used is from the office documents, contract agreements, work orders, and letters between the stakeholders and interviews, the research question primarily focuses on the causes and effects of project cost overrun that the construction of kadisco hospital expansion project encountered. And those factors are analyzed using the data from the project documents and by collecting data from the stakeholders through interviews, and questionnaires.

### 3.2 Research approach

In this project work, the study approach used is a mixed approach, both quantitative and qualitative approaches is used, mixed approach will allow for a comprehensive understanding of the issues at hand. The qualitative approach is used to identify and analyze the quality of the professionals that undertake the project that include the design team, the contractors, and the consultant and this qualitative data indicates the causes of the overrun. And the quantitative approach is used to analyze the countable data mainly in this case the discrepancy between the initial contract amount and the final actual cost of the project.

### 3.3 Description of study variables

There are so many variables that are indicated by different scholars and researchers in their study papers and for the type of project that this study is undertaking some are selected and grouped in to the phases of the project life cycle. The variables include lack of clear project goal and objective, frequent design changes, poor planning, incomplete design, poor communication, Change in the scope of the project.

### 3.4 Description of the study area and target population

Since this study is a project work focuses on a single project to solve a problem encountered during the construction of kadisco hospital extension building by identifying and analyzing the causes and effects of project cost overrun and then solve the problem, so the study area circulates around the hospital premises. The target population for the study is the stakeholders of the project mainly the owner, the different contractors participated in the project, the consultant, the design team, and the building permit authority.

This study is designed to be a problem solving so, the study's target population is selected by considering their direct involvement to the project. These stakeholders are the client which is KGH, the consultant who participated in the design of the project, doing the contract administration work, and also the supervision work, the contractors, mainly the civil contractor, mechanical contractor, electrical contractor, sanitary contractor, and finally the building permit authority who participated in the design approval of the project.

### 3.5 Data collection method

Both primary and secondary data is used in this research. The data types used for this project work is primarily focused on reviewing selected office documentation and conducting interviews with key stakeholders and finally questionnaire is distributed to the professional participated in the project. The interview and the questionnaire process takes two phase, the first is conducting an interview with the general manager of the major stakeholders to identify any new causes of cost overrun that are not considered by the researcher and on the second phase questionnaire is distributed to collect data, the questionnaire is developed and adapted from previous studies and from senior colleagues then it is customized to fit this project. By reviewing the documentation, it can help to identify discrepancies or gaps between the initial budget and the final construction cost and also used to identify any procedural mistakes or underperforming. The data is collected using mainly semi structured interviews with the major. Conducting interviews with key stakeholders is critical to get information to gain a better understanding of how the project is executed from initiation phase to the closing phase and it indicates how and what type of procedural errors were made.

### 3.6 Data Analysis

The analysis technique used in this study is mainly descriptive method, for every factor that is identified through interview and document review respondents are requested to give scale (Likert scale of 5) for each factors that cause project overrun on the construction of kadisco hospital expansion project and for the data collected from semi structured interview the pattern of the response is analyzed. Office documents are carefully analyzed and reported using descriptive method. And SPSS version 27 is used to analyze the level of impact that each factor has on the project to deal with project cost overrun.

### 3.7 Reliability and validity analysis

The reliability of the questionnaire is tasted by using Cronbach's alpha measure using the software SPSS version 27. Ellen Drost quoted Nunnally, (1978) according to the standards taken from Nunnally, Cronbach's alpha measure above 0.7 is reliable so in this study the result is 0.730 that indicate the reliability is good or acceptable.

Table 3.1: Reliability result

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
<b>.730</b>	<b>.856</b>	<b>25</b>

Source: own survey, SPSS v27

A pilot survey was conducted with some professional engineers who were available on the construction site prior to the data collection. The first draft of the questionnaire was distributed on the project site with hard copies and based on the suggestion of an engineer the format of the questionnaire is changed to an online format (google forms). The reason for that is mainly the availability of the stakeholders, since the phase one of the project is at closing stage most of the contactors are not available at the project site so to reach to them online format is chosen. The survey was carried out primarily to test and confirm that the questions were understandable and relevant to be rated by the respondent and relevant to the study's

objectives. As a results of the pilot study the questionnaire is modified and finally forwarded to the respondents.

### 3.8 Ethical Consideration

The study's ethical issues are addressed by keeping the highest levels of confidentiality for the voluntary information provided by the respondents and by only using the data to draw conclusions from the study. This impartial and independent project was thought not to negatively impact respondents in any way. As a result, the researcher takes into account all possible ethical viewpoints.

## CHAPTER FOUR RESULTS AND DISCUSSIONS

### 4.1 Introduction

This chapter describes the results and discussion of the data collected through office documentation reviews, interviews, and questionnaires. The researcher highlights the study's key findings by analyzing and interpreting the data collected. The office documentation review, interview, and questionnaire provided a wealth of data for the researcher to analyse. After careful consideration, several key findings emerged from the study.

### 4.2 A Short lifecycle history of the project

The researcher understands the history of the project through interviews and document reviews. The expansion project is first initiated by the management team of the organization after facing different problems to provide the healthcare service that the hospital was giving in the existing building facilities. So the management team discussed the issues and decided to start the project and start to look for a consulting firm to hire for the design preparation service. After intense discussions and meetings between the different client team and the consulting firm, they completed the first design and get approval from the Addis Ababa building Permit Authority.

The second step was to start the construction work, so the client picks a grade one contractor through recommendation and negotiated and agreed only to work the structural part of the project, then the client wants to hire the first consultant to the supervision and contract administration work but they can't reach to an agreement due to the remuneration fee so they picked another consultant and launched the construction work.

After the construction started and progresses the consultant and the owner agreed to change the design, the reason for the design change was due to a design error and believing the cost of the structure was over-designed, so the consultant convinced the owner that the cost can be reduced. So here comes the first design change.

Then the consultant redesigned it and get approval from the building permit authority, after the approval the construction restarted and then when the structural work reached about 80%, the owners wants to add another floor on top of the existing structure, so here comes a scope change which adds another cost on the estimated total project cost of the project.

After the structural work is completed the contractor and the client can't reach to an agreement for the rest of the work to be done by the first contractor, the reason for that was the asking price of the contractor was believed to be so expensive and hire another contractor which was a grade six contractor with less priced rate for the remaining civil work and hire another separate contractors to do the electrical works, sanitary works, the mechanical works, Aluminum works, wood works contractor, and Electro-mechanical work (elevator installation), a contractor who installs medical gas or oxygen plant on the site.

### 4.3 Document Reviews

The documents that are reviewed under this section are collected from the consultant, the contractors, and the engineering department of the hospital. This office documents are mainly includes contract agreements, payment certificates, letters written from one party to the other parties, work orders from the consultant to the contractors.

The building permit certificate given from the building permit and control authority shows that the project design is permitted or approved three times the permit number starts with P<sub>3</sub> which indicates that the project design is changed and approved at least two times. The certificate states the reason for the re-approval and it shows that there was a change in the partition wall of the design and additional floor that clearly indicates the scope change was there in the project. And this scope change affects the project total cost.

The nature of the contract agreements between the hospital and the contractors are different, the first civil contractor's agreement, the aluminum works contract, and the wood work contractor agreements includes both material and labor price and sanitary works contract include labor price and materials for limited items including pipes and minor accessories for the pipes and the sanitary fixture material is supplied by the owner. The mechanical work contract was initially labor only but for some other works mainly the reworks are including material. The other contractors agreement is only for the labor price. For those type of agreements or type of works the client agrees to provide and deliver the required material for the contractors.

There are discrepancies in the first contract amount and the final payment amount of most contractors. The only contract that doesn't shows discrepancy in the contract amount and the final paid amount is the wood works contract and that is because, the wood works contractor

is not allowed to continue by the consultant and the client after the first agreed contract due to the contractor poor workmanship.

#### 4.4 Data from the owner interview

The KGH management team initiated the project after analyzing the different problems to provide the healthcare service happening in their existing facilities and congested environment. The owners of the organization's goal and objective were to expand their health care service by adding a diagnostic center, adding laboratories, taking out some wards from the existing building facilities and put in the new expansion, there was ambiguity between the management team of the organization to choose which services and wards that have to go in the new expansion buildings due to this ambiguity there was repetitive design changes in the meantime of construction, sometimes that create demolition of partitions subject to reworks and those reworks obviously incur additional costs that add its contribution to the project's total cost.

At the project planning phase the scope of the project was defined, but the clients admitted that there was repetitive scope change and that was due to lack of detail problem analysis, their first analysis was done by only by the management team of the hospital but in the meantime of the construction different staffs of the hospital mainly doctors came and suggests different ideas by saying the project should have this department, this kind of laboratories and also other functions to be included in the ongoing project that repetitively changes the scope of the project. After making many scope changes on the first building, this scope change finally reached to an addition of two separate blocks in the premises of the hospital which is service block and commercial block. These additional blocks are not included in this study it is considered as a phase two project.

The client or the owner of the project mentioned some factors that they considered as the cause for the project cost overrun. The major causes raised by the owner's side are material cost increased by inflation, and they blame the contractors for not finishing the project on time so due to the delay of the project material becomes so expensive, the other factors raised are incompetency of the contractors and consultant, scope change, poor resource management, and shortage of material, lack of foreign currency for imported material.

Some effects of the project cost overrun are raised by the owner of the project that are quality compromisation by choosing less quality and less expensive finishing material due to lack of finance, the hospital is forced to be involved in additional debts to finance the project, finally frustration and stress was arisen among the hospital management teams and the owners of the hospital.

#### 4.4.1 Data from the contractors

There was eight different contractors participated in the construction of this project and the first contractor who construct the structural part of the project was a grade one contractor and this contractor leaves the project after the structural part of the building was completed, during their stay on the site they believe that the construction process was going smoothly without any serious complication or difficulties that leads the project to cost overrun. But there was some minor issues on the project like some missing reinforcement bars on the structural design and this kind of errors might happen in most projects so the project manager of the contractor and the engineers from the consultant solved that issue. The only issue mentioned by this contractor as a factor for the cost overrun on the project that happened during their stay was design scope change that the owners wants to add additional floor areas and that addition was rated with similar rate with the previous construction rate.

The other contractors mentioned common challenges they faced during the construction period. The most repetitively mentioned challenges are communication problem between the different constructors, complexity of the project. For most of the contractors it was their first project with this much complexity, and lack of integrated or coordinated design that create difficulties among contractors to render their respective construction because the design is not integrated in one system and there was a lot of function overlaps on the same space that can't be installed two or three systems of equipment on the same spot of space.

The contractors understands and agrees that there was no regular meetings or other means of regular discussions that would have helped the project but they think their relationship was good. The only proper meetings and discussions that takes place during the construction period was when there is problems, at that moment the consultant or the owner calls for a meeting but after that meeting is over the next meeting was not scheduled. It looks like to have a proper meeting or discussion there must be a problem. And that affects the project performance. Since the complexity of the project is high compared to other similar construction projects they think that there must have been a lot of regular meetings and

proper monitoring and evaluation system to let all the stakeholders know what the progress of the project is and to discuss any difficulties and risks then to take corrective actions.

#### 4.4.2 Data from the consultant

The consultant participated in the project as a design reviewer, contract administrator and as a supervisor. After the project is initiated by the management team of the hospital and they got the first design from another consultant, the management team selected this current consultant to get the services mentioned above. The consultant indicated that the construction process was going as planned with almost perfection level in first stages of the construction which is the construction of structural part of the project and the contract agreement with the first contractor was only for the construction of the structural part. The only issue that can be raised as a factor during the stay of the first contractor was scope change by the owners of the project which the management team of the hospital wants to get additional floor areas on to the existing structure. And the contractor didn't ask new price rate different from the previously working rate rather they just completed all the works with similar rate.

After the structural part of the project is completed, for the remaining works the contractor and the management team of the hospital started to negotiate on different terms but they can't come up to an agreement so the first contractor can't continue on the project.

The management team of the hospital and the consultant decided to select and hire different contractors for the remaining works of the project. The consultant indicates that the owners focus at this point was to select the contractor who bids with less price rate. It is the consultant's belief that most problems that can be considered as a factor for the project's cost overrun and also other problems started to be noticed on the project starting from this point.

The consultant points out different factors that they consider as a causes for the project's cost overrun that are lack of clear goal for the project by the management team of the hospital's side, repetitive scope changes on the projects planned scope, inappropriate chain of command, reworks due to quality and damaged works, the increased material cost from time to time, poor contractors ability to perform on the level of this complex project needs, shortage of material on some period of the construction time especially shortage of cement and unavailability of some sanitary fittings from the market, and complexity of the project is also mentioned by the consultant.

The effects encountered due to the project cost overrun noticed by the consultant is project delay as the owners can't import some imported materials on due time on the project site for the contractors to do their works, some materials on the project are selected by its price while the specification is neglected and less expensive materials are used, stress and frustration was also observed on the management team of the hospital and all those effects mainly affects the project owners and the end users of the hospital will also be affected when the expansion project starts its services.

#### 4.4.3 Data from the building permit and control authority

The building permit of any project starts when the owner or the consultant apply for the permit then all the documents will be checked after that the architectural design is reviewed against the building standards of Ethiopia then the other designs the structural, the electrical, the sanitary, and mechanical design if the project has mechanical design of the project will be reviewed against the standards. The engineer from the authority says that there are always professional engineers to review any type of building design in their organization.

The major design errors that professional did when they come here for design approval is setback standards are not respected as the standard, minimum space allocation for the greeneries, there are also room that are not well lighted and well ventilated.

#### 4.5 Factors of Project cost overrun

Based on the interviews conducted with the consultant, contractors and owner of the hospital, several factors were identified as contributing to the project cost overrun during the construction of the hospital building. These factors include poor planning, incomplete designs, poor cost estimation, poor risk identification and management, material cost increases due to inflation, shortage of materials, scope change, complexity of the project, change orders (requiring rework), inappropriate chain of command, increased labor costs, bad weather, lack of clear goals and objectives on the side of the client, poorly defined scope on the side of the client, poor resource management, poor communication among stakeholders, incompetent contractors and consultants, inaccuracies in the work breakdown structure, lack of clear goal and objective shared by all stakeholders, inadequate site

management and supervision, design errors, poor site conditions, and payment delays for contractors.

The identified factors indicate that multiple issues contributed to the cost overruns, and these factors are occurred in the different phases of the project life cycle of the hospital construction project.

#### 4.6 Effects of Project cost overrun

The project cost overrun encountered in this construction project affects the building overall performance and the stakeholders. Most of the effects are on the project owners that are quality compromisation by choosing less quality and less expensive finishing material due to lack of finance, the hospital is forced to be involved in additional debts to finance the project, finally frustration and stress was arisen among the hospital management teams and the owners of the hospital, a little project delay was also the other effect as the owners can't import some imported materials on due time, the consultant is forced to choose less quality and less expensive material neglecting or revising the specifications, stress and frustration among the management team of the hospital, the owner of the hospital is also forced to look for additional finance and debts, the reputation of the contractors and the consultant is negatively affected, and the management of the hospital is forced to select and hire low grade contractors to pay less labor price.

The discrepancy of each contract and percentage of each contracts are summarized in the following table.

Table 4.1: contract discrepancy and cost overrun

No	Contractors (work types)	Contract Amount	Final Payment	Discrepancy	Cost overrun in (%)
1	Structural works contractor	41,695,675.29	43,351,087.51	1,655,412.22	<b>3.97%</b>
2	Electrical installation Works	1,948,721.00	2,021,421.00	72,700.00	<b>3.73%</b>
3	Mechanical works	2,664,325.46	3,241,573.18	577,247.72	<b>21.67%</b>
4	Civil works	6,422,039.73	7,424,256.41	1,002,216.68	<b>15.61%</b>
5	Aluminum works	5,636,394.93	6,428,763.50	792,368.57	<b>14.06%</b>
6	Sanitary works	5,819,089.80	6,042,188.25	223,098.45	<b>3.83%</b>
7	wood works	1,325,721.00	1,325,721.00	-	<b>0.00%</b>
8	Medical gas Installation works	-	-	-	-

Source: office documents

As it is discussed earlier some of the contracts are labor based and some are labor with material and the building design permitted three times due to scope changes. The building permit authority estimates all the designs when they get approved so this project was estimated in the second permit at Birr 39,042,000.00 and on the third permit at Birr 96,660,000.00 and the consultant first estimates was during the second permit and it was Birr 72,172,381.62 and the final total amount the owners spend on the project is Birr 153,323,397 the total cost overrun of the project taking the consultant estimate and the final project cost is 112.44%.

The different letters mainly from the consultant shows that there were warning letters that asks the contractor to speed up their respective works and wars them that they are not coping up with the schedule which they submit to the consultant. These type of letters are repetitively noticed and if the letters was repetitive it shows that the contractors was not correcting the problem and didn't take corrective actions so if the contractors were not taking corrective actions repetitively it put the contractors competency for this level of complex project in question. And these letters also indicates that there was a delay in the project

compared to the planned schedule and project delay most of the time create project cost overrun because most materials price increase from time to time.

Some letters from the client and work order letters from the consultant to the contractors shows that there are reworks and on some of work orders are to demolish the works already completed and rework it differently. So these demolition and reworks affects the project and contribute to the project cost overrun.

It is noticed on the documents that two contractors are level 6 and level 7 contractors. According to the building permit and control authority directive these contractors should have not participated in this project which is valued at Birr 96,600,000.00 by the authority. The only possible way for these contractors to participate on this project was to work as a sub-contractor under the guidance of the level one contractor but in this case the level one contractor has already left the project after the structural part is completed. So these contractors are illegible for this complex project.

Table 4.2: Bidding price of contractors

Grade	Bid Price for contractors in million birr		
	Building	Road	General
1	Unlimited	Unlimited	Unlimited
2	Up to 750	Up to 1,300	Up to 1,500
3	Up to 350	Up to 600	Up to 700
4	Up to 200	Up to 300	Up to 350
5	Up to 100	Up to 150	Up to 180
6	Up to 40	Up to 60	Up to 70
7	Up to 20	Up to 30	Up to 40

Source: Ministry of construction directive No. 648/2021

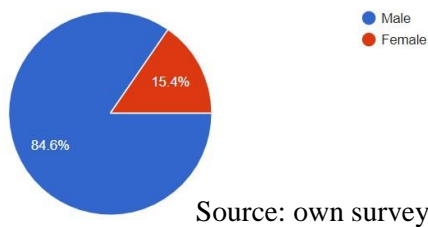
## 4.7 Level of impact of Cost overrun Factors

The level of impact of each factors causing project overrun on this project is measured by questionnaire using Likert’s scale of 5 from very high to very low and it is rated by engineers who participated in the project and other stakeholders from the project. A total of twenty seven people respond to the questionnaire 4 from the client 6 from the consultant and 17 from the different contractors.

### Demography of respondents

The demographics of the respondents participated in the survey are summarized below:

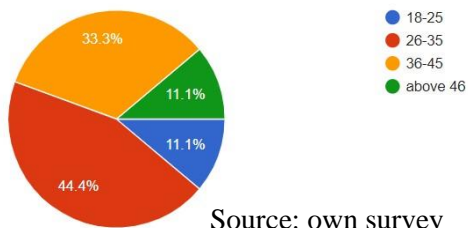
Fig 4.1: Gender of respondents



Source: own survey

The major respondents who participated on the survey from the project is male at 84.6%.

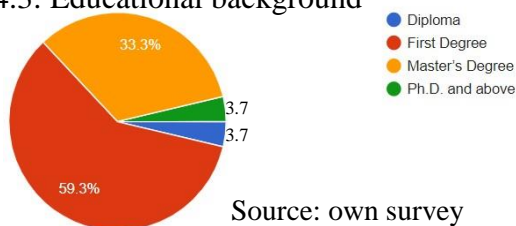
Fig 4.2: Age of respondents



Source: own survey

The figure indicates that the majority of the respondents are young professionals aged between 26 and 35 which takes 44.4% of the total the second major respondents are aged between 36 and 45 with 33.3% of the total.

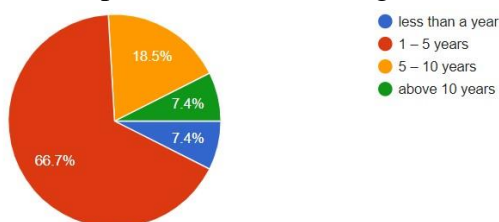
Fig 4.3: Educational background



Source: own survey

59.35 of the respondent are first degree holder and are majority.

Fig 4.4: Experience in current organization



Source: own survey

Majority of the respondents has worked in their current organization for about 1 to 5.

The linkert scale of five is considered an interval scale. The mean value is very significant to analyze the data. From 1 to 1.80 it means very low, from 1.81 to 2.60 it means Low, from 2.61 to 3.40 it means moderate or neutral, from 3.41 to 4.20 it means high, and from 4.21 to 5.0 it means very high. (Pimentel, 2010)

Table 4.3: Summary of responses and level of impact of each factors ranked

Factors	Very Low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)	Mean	Rank
Material cost increased by inflation	0	1	1	7	18	4.556	1
shortage of material	0	1	2	11	13	4.333	2
scope change	0	3	2	8	14	4.222	3
Complexity of the project	0	2	1	14	10	4.185	4
Change order (rework)	0	2	4	11	10	4.074	5
Inappropriate chain of command	0	3	5	7	12	4.037	6
Labor cost increased	0	4	6	11	6	3.704	7
Lack of Clear goal and objective (client has)	1	4	8	8	6	3.519	8
Lack of defined scope (client has)	1	4	11	6	5	3.370	9
incomplete design	3	5	7	6	6	3.259	10
Poor resource management	0	9	6	8	4	3.259	11
poor communication b/n stakeholders	0	9	6	9	3	3.222	12
poor cost estimation	1	7	8	8	3	3.185	13
incompetent contractors and consultant	0	7	9	10	1	3.185	14
Inaccuracy of the work breakdown structure	1	5	10	11	0	3.148	15
Poor risk identification and management	1	8	10	6	2	3.000	16
Lack of Clear goal and objective known by all stakeholders	2	7	10	5	3	3.000	17
poor planning	0	11	8	7	1	2.926	18
Lack of Clearly defined scope known by all stakeholders	1	11	12	2	1	2.667	19
Failure to understand client's requirements	1	13	11	2	0	2.519	20
Poor site management & supervision	6	11	10	0	0	2.148	21
Design error	5	17	4	1	0	2.037	22
Poor Site condition	8	13	6	0	0	1.926	23
Bad weather condition	13	6	7	0	1	1.889	24
Payment delay for contractors	17	9	1	0	0	1.407	25

Source: own survey and SPSS V. 27 result

According to the finding results as shown in the table the factors causing project cost overrun that have significant impact on the project are ranked and the top five ranked factors that have more impact on the project are material cost increased by inflation, shortage of material,

scope change, complexity of the project and change order (rework). And the factors that have a minimum impact on the project based on the findings are Poor site management and supervision, design error, poor site condition, bad weather condition, and payment delay for contractors.

According to Pimentel's (2010) scale the first eight factors that are material cost increased by inflation, shortage of material, scope change, complexity of the project and change order (rework). Inappropriate chain of command, labor cost increased, and lack of clear goal and objective (client has) can be categorized as a high impactful factors because their mean value is 3.41 and only one factor will be categorized in the very low impact zone since it is the only mean value which has below 1.8.

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATION

#### 5.1 Introduction

In this chapter of the paper the researcher concludes the major findings of the study regarding the project cost overrun on the construction of Kadisco hospital expansion project and forwards recommendations for the major stakeholders of the project to avoid or mitigate project cost overrun on the second phase of the project and also other similar projects.

#### 5.2 Conclusion

The study highlights various factors that contribute to the cost overrun of the construction of kadisco general hospital expansion project. As it is established in the study findings, material cost increased by inflation, shortage of material, scope change, complexity of the project and change order (rework) were the major or the top five factors that have high impact on the construction of the project. Additionally, there are twenty factors identified in this project as cost overrun causing factor having different level of impact.

All those factors arises from the different lifecycle of the project from project initiation to project execution and project monitoring and evaluation phases. And those factors contributed to the project to deal with project cost overrun and this cost overrun affects the overall performance of the project.

The effects of the cost overrun on the project affects mainly the owners of the project, the effects are, it makes difficult to the owners to finance the project, it creates stress and frustration among the management team of the hospital, and it forces the owners to look for additional debts. The effects of the cost overrun is not only on the owners but also on the contractors and the consultants too. The consultant is forced to choose less expensive material due to shortage of finance. The cost overrun was also one of the reasons for the project to delay among the many other reasons. Due to the delay of the project the contractors and the consultant spend too much time on the project while they can put their resources and knowledge on other projects. Additionally, the cost overrun negatively affects the reputation of the contractors and the consultant.

Finally the study provides mitigation strategies from interviewing senior professionals and reviewing previous studies and the strategies includes using efficient project management tools and practices, implement a rigorous risk management plan, establish clear

communication channels between all stakeholders involved in the project, and using technology such as Building Information Modeling (BIM). By implementing these critical strategies on the second phase of the project, the hospital can mitigate or avoid the chance of project cost overrun from happening in the project again and complete the whole project successfully. Implementing those strategies will also help other construction projects to minimize cost overrun and achieve successful project outcomes.

As of the findings, material cost increased by inflation is ranked above all the factors having more impact on the project to deal with cost overrun that means this factor is critical factor so if there is a way to control this factor there will be a huge relief on projects to mitigate project cost overrun so, it is the researcher's suggestion for future studies to be based on the causes of inflation and control mechanism of inflation.

### 5.3 Recommendation

The following recommendations are forwarded by the researcher based on the study findings to the main stakeholders who participated in this project and for other concerned bodies too. The main stakeholders are the client, the different contractors, and the consultant.

#### 5.3.1 To the client

Clients or owners of the project are one of the most significant stakeholders in any project who invest their money for the realization of the project they play critical role from the project initiation phase to the project closing stage of any project. Accordingly the following recommendation are forwarded to the management team of the hospital to apply it on the second phase of the expansion project and other future projects too.

1. When the owner of the project initiate any expansion project they must have a detail analysis of the problem what the new project will solve.
2. The management team of the organization should clearly define and state the goal and objective of the project before proceeding to further stages and the goal and objective of the project should be forwarded to the other stakeholders.
3. The management team should consult or include other staff of the hospital on their team to give feedback on the design before starting the construction.

4. The management team should accept advice from the consultant before they select the contractor, the consultant and the management team should evaluate the technical capability of the contractors not only their bidding price before selecting and signing the contract with the contractors.
5. As much as possible the management team of the hospital should define the scope of the project before starting the construction work and should try not to change in the meantime of the construction, if they did well on the problem identification, the objective of the project, and select the proper consultant for the design of project their chance of making scope change can be minimized. If changing the scope is a must to do the management team and the consultant should apply a proper scope change management practice on their project.
6. The owner of the project or the sponsor of the project should be prepared well to finance the project and should have a plan to finance the imported materials because the imported materials need foreign currency.

### 5.3.2 To the contractors

Contractors in the construction project plays significant roles, they are the main stakeholders in the construction projects who transforms the design in to the reality.

1. The contractors should evaluate themselves and know their capabilities before signing any contract agreements.
2. All type contractors should hire professional and well qualified skilled workers to minimize or avoid the reworks come from the poor workmanship.
3. The contractors should develop their communication skill among themselves and with other contractors generally with all the stakeholder because this kind of complex projects need strong coordination between them.
4. The contractors should have a good project planning culture in their organization and also they should have well organized work breakdown schedule and as much as possible they should follow up and work according to their plan and schedule.
5. They should develop their resource management practice on the project site to minimize the wastage of the construction materials since wastage of material and poor resource management is one of the main factor that causes project cost overrun in the project.

6. The contractor should be loyal and disciplined to their profession and should only participate on projects that the authority directive allows them or make them eligible based on their category level and the projects estimated cost.

### 5.3.3 To the consultant

The consultant might participated in the projects from the initiation to the closing phase of project lifecycle, the service may include design of the project, contract administration, so these services are critical and very important for the success of the project, so for the success of projects and to keep projects away from cost overrun it is important to implement the following recommendation

1. The consultant should hire well experienced professional to design this kind of complex projects or should develop the skill to work with other external consultants by out sourcing or making a joint venture for projects that are beyond the consultant's capability.
2. The consultant should consult the owner of the project and participate directly in the selection of contractors for the project because the owner of the project might not have experience in the criteria for selecting the contractors, hiring the appropriate contractors for the project is important not only to mitigate cost overrun but also for the success of the whole project.
3. The consultant should develop structured monitoring and evaluating system by implementing regular monitoring and evaluation strategies will enable them to stay on top of project progress, identify challenges, and take an appropriate corrective action with any deviations quickly.
4. The consultant should schedule a regular meeting and discussion time with main stakeholders to discuss the challenges and forward solutions for the challenges quickly and this will improve the stakeholder's communication among themselves.
5. The consultant should evaluate the cost performance of the different contractors regularly against the planned works and the performed works.

#### 5.3.4 To building permit and control authority

The building permit and control authority is the one who reviews and approve all the designs that are going to be constructed in the city of Addis Ababa. Since all the designs passes through the organization, this authority plays significant role in the construction industry by approving the design with the required standards. To keep doing that some recommendations are forwarded to the authority:-

1. The authority should make sure that the designs that are approved are as per the standards and must make sure the designs are complete in terms of all the required designs so that the cost overrun that comes from the incompleteness of the design will be avoided or mitigated.
2. The authority should continue its follow up and control of the construction project till the closing stage of the project so that they will control the contractors if they are legible for the project.

## References

Adnan Enshassi, Jomah Al-Najjar, Mohan Kumaraswamy (2009) Delays and cost overruns in the construction projects in the Gaza Strip, *Journal of Financial Management of Property and Construction* Vol. 14 No. 2,

Azhar, Farooqui & Ahmed (2008). Cost Overrun Factors In Construction Industry of Pakistan. Paper presented at the First International Conference on Construction in Developing Countries.

Baloi, D. and Price, A.D.F. (2003). Modelling global risk factors affecting construction cost performance. *International Journal of Project Management* 21(4), pp. 261-269.

Bent Flyvbjerg, Mette K. Skamris Holm and Søren L. Buhl, (2004) "What Causes Cost Overrun in Transport Infrastructure Projects?" *Transport Reviews*, vol. 24, no. 1, pp. 3-18.

Daniel Bekele, (2017), Factors influencing cost overrun: the case of water and sanitation construction project in Addis Ababa, A Thesis Submitted to the School of Commerce Addis Ababa University

Directive No. 648/2021, (2021) Construction Certification and Registration Regulation, federal democratic republic of Ethiopia, ministry of urban development and construction pp. 79.

Ellen A. Drost, *Validity and Reliability in Social Science Research, Education Research and Perspectives*, Vol.38, No.1

Fetene Nega (2008), causes and effects of cost overrun on public building construction projects in Ethiopia. a thesis submitted to the school of graduate studies of Addis Ababa University, faculty of technology

Frimpong, Y., Oluwoye, J. and Crawford, L. (2003). Causes of delay and cost overruns in construction of groundwater projects in a developing country; Ghana as a case study. *International Journal of Project Management* 21(5), pp. 321-326.

Gkritza, K. and Labi, S. (2008). Estimating Cost Discrepancies in Highway Contracts: Multistep Econometric Approach. *Journal of Construction Engineering and Management* 134(12), pp. 953-962.

Hiten M Gawad, Kalpesh M Gawad, Maithilee V Thakare, (2020), Strategies to Reduce Cost Overrun, Delays and Risk Involved in Construction Management, International Journal for Research in Engineering Application & Management (IJREAM)

I. Abdul Rahman, A. Hameed Mem, and A. Tarmizi Abd.- Karim, (2013) “Significant factors causing cost overruns in large construction projects in Malaysia,” Journal of Applied Sciences, vol. 13, no. 2, pp. 286–293.

Ismail Abd Rahman, Yaser Gamil, Sasitharan Nagapan (2019), Investigating the effect of poor communication in terms of cost and time overruns in the construction industry, international journal of construction supply chain management volume 9 number 2

Jackson, & Steven (2001). Management of cost overrun in selected building construction project in Ilorin. Review of Business and Finance,

J.L.Pimentel. (2010) A Note on the Usage of Likert Scaling for Research Data Analysis. USM R&D Journal, vol. 18, (2), 2010. ISSN 0302-7937.

James Odeck, (2004) Cost overruns in road construction—what are their sizes and determinants? Transport Policy 11 (2004) pp 43–53 Pergamon

Jason Westland, (2007) the Project Management Life Cycle AEW Services, Vancouver, BC ©2007

Kerzner, Harold. (2006). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. 9th ed. New Jersey

Koushki, P.A., Al-Rashid, K. and Kartam, N. (2005). Delays and cost increases in the construction of private residential projects in Kuwait. Construction Management and Economics **23**(3), pp. 285-294.

Love, P.E.D., Wang, X., Sing, C.-P. and Tiong, R.L.K. (2012). Determining the Probability of Project Cost Overruns. Journal of Construction Engineering and Management **1**(1), pp. 438-438.

Maerege Gebrehewot, Maru Shete, (2019) Factors Affecting Performance of Commercial Building Projects in Lideta Sub-City, Addis Ababa, Journal of Business and Administrative Studies (2019), Vol. 11, No. 1

Matti Siemiatycki (2015), Cost Overruns on Infrastructure Projects: Patterns, Causes, and Cures, Institute on Municipal Finance & Governance Munk School of Global Affairs, University of Toronto.

Nadzirah Binti Roslan, (2015) Mitigation measures for controlling time and cost overrun, a thesis submitted to Faculty of Civil and Environmental Engineering University of Tun Hussein Onn Malaysia.

Naveenkumar.G.V, Prabhu.V, (2016) “Factors Influencing Time and Cost Overruns in Construction Projects” Vol. 5, Issue 4, 2016

Niluka Domingo, (2015) “Assessment of the Impact of Complex Healthcare Features on Construction Waste Generation”

Ray R. Venkataraman and Jeffrey K. Pinto, (2008) Cost and value management in projects, John Wiley & Sons, Inc.

Ruth Apolot, Henry Alinaitwe, Dan Tindiwensi, (2011) Investigation into the Causes of Delay and Cost Overrun in Uganda’s Public Sector Construction Projects, Second International Conference on Advances in Engineering and Technology

Solomon belay, James Goedert, Asregedew Woldesenbet, Saeed Rokooei (2021) Comparison of BIM Adoption Models between Public and Private Sectors through Empirical Investigation, Hindawi, Advances in Civil Engineering, Volume 2021, Article ID 5577654,

Yohannes Adamu, (2018) “assessing the main contributing factors of cost overrun: in the case of 20/80 housing program of addis ababa city administration”

Zhu. K. and Lin.L, (2004). A stage by stage factor control frame work for cost estimation of construction projects. In Owners Driving Innovation International.

<http://kadcogroup.com/kgh/about-us/> (accessed: 12 April 2023)

## Appendix

### A. Questionnaire

#### Dear respondents

The purpose of this questionnaire is to carry out a study on the topic of “Factors causing project cost overrun in the Construction of Kadisco General Hospital expansion project” for the partial fulfillment of Masters of Arts degree in Project Management. The study focus is on the causes of project cost overrun on the kadisco hospital expansion projects, the study will be helpful for the second phase of the project and other similar projects too. So your participation is important.

I kindly request you to respond the questions listed below. Any information you present will be kept absolutely confidential and will only be used to academic purpose. Your willingness and cooperation is highly appreciated and I want to thank you in advance for time and cooperation.

Elias Mohammed

Addis Ababa university school of commerce

#### **Questionnaire Section 1: General Background Information**

##### **Please Circle your response**

1. Gender

A. Male      B. Female

2. Age

A. 18-25      B. 26 – 35      C. 36 – 45      D. above 46

3. Your Educational background?

A. Diploma      B. First Degree      C. Master’s Degree      D. Ph.D. and above

4. How long have you worked in the organization?

A. less than a year      B. 1 – 5 years      C. 5 – 10 years      D. above 10 years

**Questionnaire Section 2: Assessment of Level of Impact of the factors**

Please give your response by marking (√) in the corresponding space

No.	Factors Causing Cost overrun	Level of Impact				
		Very Low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
	<b>Project initiation phase</b>					
1	Lack of Clear goal and objective (client has)					
2	Lack of defined scope (client has)					
	<b>Project Planning phase</b>					
3	Failure to understand client's requirements					
4	poor planning					
5	Poor risk identification and management					
6	Inaccuracy of the work breakdown structure					
7	poor cost estimation					
8	Lack of Clearly defined scope known by all stakeholders					
9	Lack of Clear goal and objective known by all stakeholders					
10	Design error					
11	incomplete design					
	<b>Project Execution phase</b>					
12	scope change					
13	Material cost increased by inflation					
14	Labor cost increased					
15	Bad weather condition					
16	incompetent contractors and consultant					
17	Payment delay for contractors					
18	Change order (rework)					
19	shortage of material					
20	Poor resource management					
21	Poor site management & supervision					
22	poor communication b/n stakeholders					
23	Poor Site condition					
24	Inappropriate chain of command					
25	Complexity of the project					

You can add any factor that you consider as a cause of cost overrun and rate its impact?

27. Please Provide any effects occurred in the project due to the cost overrun?

---

You can use back page of the paper if you want to add for any suggestion.

THANK YOU

## B. Interview questions

To Client:

1. What pushes you to initiate this expansion project?
2. How was the overall process or short history of the project so far?
3. What was the goal and objective of the expansion project?
4. What was the scope of the Kadisco Hospital Expansion Project?
5. Did you make any scope change during the construction that contribute to the cost overrun?
6. Can you identify any particular factors that contributed to cost overruns in the project?
7. What effects did you encounter due to the project cost overrun that happened on this project?
8. Can you provide any recommendations to prevent future cost overruns in the second phase of the project or other similar projects?

To Contractors:

1. What was your involvement in the Kadisco Hospital Expansion Project?
2. Can you describe the challenges you faced during the construction process of this project?
3. Did you encounter any unforeseen issues that caused costs overrun on this project?
4. Did you make any changes to the original plan that contributed to cost overruns on this project?
5. How did you manage the communication and relationship with other stakeholders involved in the project?
6. Can you provide any recommendations to prevent future cost overruns in the second phase of the project or other similar projects?
7. What effects did you encounter due to the project cost overrun that happened on this project?

To Consultant:

1. Can you describe the services you provided for the Kadisco Hospital Expansion Project?
2. Did you notice any issues during the construction process that could have contributed to cost overruns on kadisco hospital expansion project?
3. From your experience, what are the most common causes of cost overruns in construction projects?

4. How was your project monitoring and evaluation mechanism?
5. What effects did you encounter due to the project cost overrun that happened on this project?
6. Can you provide any recommendations to prevent future cost overruns in the second phase of the project or other similar projects?

To Building permit Authority

1. How does the design approval process is undertaken in your organization?
2. Was there enough professionals to review and approve all types of hospital project during kadisco hospital project?
3. What are the major design errors professionals make when they bring their design for approval?
4. What is your recommendation for professionals to have a complete design?